MRMS Transition to Operations

NSSL MRMS User Information

Updated 12/19/2014

Added notice to section 5 about planned January update

Questions? Please contact Dr. Heather Grams at Heather.Moser@noaa.gov* or Carrie Langston at *Carrie.Langston@noaa.gov

1. Domain Changes

The overall MRMS domain will remain unchanged. However, there will no longer be any tiled products. All products will be made available as CONUS files only. For reference, the MRMS domain is defined in the table below.

Table 1: MRMS CONUS domain

	MRMS Domain
Grid size (NX x NY x NZ)	7000 x 3500 x 33
Grid resolution	0.01° lat x 0.01° lon
NW corner grid cell upper left corner	55.00N, 130.00W
SE corner grid cell lower right corner	20.00N, 60.00W
NW corner grid cell center	54.995N, 129.995W
SE corner grid cell center	20.005W, 60.005W
Vertical levels (km MSL)	0.5, 0.75, 1.0, 1.25, 1.5, 1.75, 2.0, 2.25, 2.5, 2.75, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5, 8.0, 8.5, 9.0, 10.0, 11.0, 12.0, 13.0, 14.0, 15.0, 16.0, 17.0, 18.0, 19.0

2. Changes to 3D Reflectivity

The operational MRMS generates two 3D reflectivity grids. The first is called “conus” and built using only WSR-88D data. The second is called “conusPlus” and built using WSR-88D and Canada radar data. It will eventually included other radars such as TDWR.

The research version of MRMS at NSSL provides “conusPlus” data every 2-minutes. It’s organized into four 3D files (one file per tile). The operational MRMS no longer provides data in 3D files. Instead, the data is distributed as a set of 2D CONUS files (one per vertical level).

3. Changes to reflectivity field used to derive severe weather products

The research version of MRMS at NSSL derives its severe weather products (e.g., Composite Reflectivity, VIL, POSH) using the “conusPlus” 3D reflectivity field. The operational MRMS uses the “conus” field.

Note: The precip products will continue to use Canada data as well as WSR-88D data.

4. Data service

At this time, operational MRMS data is available only via LDM (http://www.unidata.ucar.edu/software/ldm/). NCEP Central Operations can provide the details for connecting. Send email to ncep.list.idp_support@noaa.gov.

5. Format changes and sample data

IMPORTANT NOTE: An update scheduled for the operational MRMS will result in changes to the units and missing/no coverage values for about a dozen products. The patch is scheduled for implementation in Jan 2015. The GRIB2 information below reflects the changes in the forthcoming update. However, the majority of this information is also valid for the current operational system.

The default format for the research MRMS at NSSL is “MRMS binary”. The operational system distributes data in GRIB2. Internal PNG compression is used along with gzip.

The GRIB2 IDs used by MRMS are not officially sanctioned at this time. Instead, MRMS uses a local discipline number (209) and it’s own set of category and parameter values. This means that most widely available GRIB2 decoders will require customization.

The current GRIB2 IDs for MRMS data can be found here…

http://www.nssl.noaa.gov/projects/mrms/operational/tables.php

Originating Center: 161 (US NOAA Office of Oceanic and Atmospheric Research)
Subcenter: 0 (National Severe Storms Lab)
Discipline: 209

A comma delimited version of the table can be found here…

ftp://ftp.nssl.noaa.gov/projects/MRMS/GRIB2_TABLES/UserTable_MRMS_v10.0.1.csv

To help users adjust to GRIB2, NSSL modified the latest wgrib2 library (http://www.cpc.noaa.gov/products/wesley/wgrib2/) to recognize MRMS fields. There are two options available for obtaining the modified code…

a. Download entire wgrib2 (v2.0.1) library including MRMS modifications

   A tar file containing a complete copy of wgrib2 v2.0.1 with the modified and newly created source code for reading MRMS data can be found on the NSSL FTP server here…

   ftp://ftp.nssl.noaa.gov/projects/MRMS/GRIB2_DECODERS/MRMS_modified_wgrib2_v2.0.1.tgz

   To compile, download the tar file from the location above, untar (e.g., tar xvfz MRMS_modified_wgrib2_v2.0.1.tgz) and follow standard wgrib2 instructions found here…

   http://www.cpc.ncep.noaa.gov/products/wesley/wgrib2/compile_questions.html (skipping steps 1 and 2)

b. Download only the newly created and modified files

   The modifications to wgrib2 should work for wgrib2 v1.9.8 or newer. To allow users more flexibility in what version of wgrib2 they use (v1.9.8 - 2.0.1), a tar file containing only the modified and newly created source code has been posted on the NSSL FTP server here…

   ftp://ftp.nssl.noaa.gov/projects/MRMS/GRIB2_DECODERS/MRMS_modified_wgrib2_v2.0.1-selectfiles.tgz

   The tar file contains a README.mrms file with instructions for implementing the code.

IMPORTANT NOTE: Patches scheduled for the operational MRMS will result in changes to the units for about a dozen products. When this occurs, a modified copy of wgrib2 will be posted. Please check back here for updates on when this will occur.

There are also efforts currently underway to officially modify degrib (http://www.nws.noaa.gov/mdl/NDFD_GRIB2Decoder/) to read MRMS GRIB2 data. This document will be updated when a new degrib version is available.

Both wgrib2 and degrib are capable of writing data in multiple formats including netCDF. Please see their respective sites for more details.

*** *For questions about reading MRMS GRIB2 data using wgrib2, please contact Dr. Heather Grams at Heather.Moser@noaa.gov* ***

Example data from the operational MRMS is available on the NSSL FTP server. The examples are a sampling of the products. There are several others not included.

Table 2: Location of example MRMS GRIB2 data

Product Suite	Location
3D Reflectivity (88D only)	ftp://ftp.nssl.noaa.gov/projects/MRMS/SAMPLE_GRIB2_FILES/MRMS_GRIB2_SAMPLE-reflectivity_3d.tar
3D Reflectivity (88D+Canada)	ftp://ftp.nssl.noaa.gov/projects/MRMS/SAMPLE_GRIB2_FILES/MRMS_GRIB2_SAMPLE-reflectivity_3d_plus.tar
Severe Weather	ftp://ftp.nssl.noaa.gov/projects/MRMS/SAMPLE_GRIB2_FILES/MRMS_GRIB2_SAMPLE-svrwx.tar
Severe Weather Rotation	ftp://ftp.nssl.noaa.gov/projects/MRMS/SAMPLE_GRIB2_FILES/MRMS_GRIB2_SAMPLE-svrwx_rotation.tar
Precip	ftp://ftp.nssl.noaa.gov/projects/MRMS/SAMPLE_GRIB2_FILES/MRMS_GRIB2_SAMPLE-precip.tar

6. Old vs. new product names

The naming convention for MRMS products has changed significantly. The following table maps between the old and new product names.

The MRMS binary filename convention is [product name].YYYYMMDD.HHmmSS.gz

The GRIB filename convention is
MRMS_[product name]_HH.HH_YYYYMMDD-HHmmSS.grib2.gz,

where HH.HH = height of level in km MSL and YYYYMMDD-HHmmSS = the UTC date and time.

Table 3: Translation of MRMS product names between research and operational systems

Research system (MRMS binary)	**Operational system (GRIB2)** **(prepend "MRMS_")**
BASE_REFL	MergedBaseReflectivityQC
BBBOTTOM	BrightBandBottomHeight
BBTOP	BrightBandTopHeight
CREF	MergedReflectivityQCComposite
CREFH	HeightCompositeReflectivity
CREF_MAX	MergedReflectivityQComposite
ETP18	EchoTop_30
LCREF	LowLevelCompositeReflectivity
LCREFH	HeightLowLevelCompositeReflectivity
LCR_LOW	LayerCompositeReflectivity_Low
LCR_HIGH	LayerCompositeReflectivity_High
LCR_SUPER	LayerCompositeReflectivity_Super
MEHS	MESH
MREF3D33L	conus/MergedReflectivityQC_HH.HH, conusPlus/MergedReflectivityQC_HH.HH
PCPFLAG	PrecipFlag
POSH	POSH
RQI	RadarQualityIndex

SHI	SHI
SHSR	SeamlessHSR
SHSRH	SeamlessHSRHeight
STRMTOP30	EchoTop_30
TREFL_0C	Reflectivity_0C
TREFL_-10C	Reflectivity_-10C
UNQC_CREF	MergedReflectivityComposite
VIL	VIL
VILD	VIL_Density
[1,3,6,12,24,48,72]HRAD	RadarOnly_QPE_[01,03,06,12,24,48,72]H
[1,3,6,12,24,48,72]HGC	GaugeCorr_QPE_[01,03,06,12,24,48,72]H
[1,3,6,12,24,48,72]HGAUGE	GaugeOnly_QPE_[01,03,06,12,24,48,72]H
[1,3,6,12,24,48,72]HMMAPPER	MountainMapper_QPE_[01,03,06,12,24,48,72]H

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